



UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/524,229	02/09/2005	Masayoshi Kitada	13425.0064USWO	1558
23552	7590	07/25/2007		
MERCHANT & GOULD PC P.O. BOX 2903 MINNEAPOLIS, MN 55402-0903			EXAMINER MENDEZ, ZULMARIAM	
			ART UNIT 1753	PAPER NUMBER
			MAIL DATE 07/25/2007	DELIVERY MODE PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/524,229	Applicant(s) KITADA ET AL.	
	Examiner Zulmariam Mendez	Art Unit 1753	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 02/09/2005.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1-4 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1-4 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☒ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☒ All b) ☐ Some * c) ☐ None of:
1. ☒ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|---|---|
| 1) <input checked="" type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input checked="" type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date <u>02/09/2005</u> . | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.

3. Claims 1-3 are rejected under 35 U.S.C. 103(a) as being unpatentable over Chambers (US Patent no. 6,126,794) in view of Bockris et al. (US Patent no. 4,734,168).

With regard to claim 1, Chambers discloses an apparatus for the production of hydrogen consisting of electrodes (205a-d of figure 2) connected to power supply terminals (108a, 108b) so that they can receive a pulsed electrical signal from a power supply (col.4, lines 29-33); a container holding water and at least one pair of closely spaced electrodes arranged within the container and submerged in the water (abstract). However, Chambers fails to disclose electrodes comprising a semiconductor or a semiconductor compound.

Art Unit: 1753

Bockris teaches a process for the photo-electrolysis of water to produce hydrogen and oxygen using semiconductor electrodes (abstract) in order to provide for a direct decomposition of water at the electrodes, acquire a more stable and cost effective system and increase the efficiency for hydrogen production at the cathode (col. 2, lines 33-38). Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to use a semiconductor electrode, as taught by Bockris, in the apparatus for the production of hydrogen of Chambers in order to provide for a direct decomposition of water at the electrodes, acquire a more stable and cost effective system and increase the efficiency for hydrogen production at the cathode.

With regard to claim 2, the semiconductor forming the electrodes, as taught by Bockris, comprises silicon (col. 2, lines 8-9).

With regard to claim 3, Chambers discloses all of the structure as applied above to claim 1, wherein the electrodes are flat plates (col. 4, lines 13-15).

4. Claim 4 is rejected under 35 U.S.C. 103(a) as being unpatentable over the modified Chambers and Bockris, as applied to claim 1 above, and further in view of Weinberg et al. (US Patent no. 6,638,413).

With regard to claim 4, the modified Chambers teaches all of the limitations as applied above to claim 1, having electrodes (205a-d of figure 2) connected to power supply terminals (108a, 108b) so that they can receive a pulsed electrical signal from a power supply (col.4, lines 29-33), but fails to teach that the system is stopped after applying the first pulse signal between the electrodes for a predetermined time interval; exchanging the materials of the positive and negative electrodes with each other

Art Unit: 1753

(polarities), and then, the pulse electric power is applied again. However, Weinberg discloses a method and apparatus for electrolysis of water for enhanced production of oxygen, hydrogen and heat impressing a repeating sequence of voltages across the cathode and anode comprised of at least two cell voltage regimes (abstract). The first cell voltage regime consists of a voltage sufficient to enhance cathodic absorption of hydrogen, and a second cell voltage regime consisting of at least one voltage pulse which is at least two times the voltage of the first cell voltage regime (col. 2, lines 9-15). The first cell voltage regime could be a time varying voltage, a biphasic (polarity reversing) voltage, among others, and combinations thereof in order to change the polarity of the electrodes (col. 6, lines 45-49), prevent the adhesion of undesired byproducts at the electrodes and prevent reduction in efficiency of energization of the electrodes from occurring. Therefore, it would have been obvious to one having ordinary skill in the art at the time of the invention to stop the system for a while after the first voltage is applied so as to exchange the polarities of the electrodes, as taught by Weinberg, in the apparatus for the production of hydrogen of Chambers, in order to prevent the adhesion of undesired byproducts at the electrodes and prevent reduction in efficiency of energization of the electrodes from occurring.

Conclusion

5. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Zulmariam Mendez whose telephone number is 571-

Art Unit: 1753

272-9805. The examiner can normally be reached on Monday-Thursday, 8:30am-5:00pm, EST.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Alexa Neckel can be reached on 571-272-1446. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

ZM *gnt*



ALEXA D. NECKEL
SUPERVISORY PATENT EXAMINER